

Claims:

1. A method for the production of D-mannitol with the use of mannitol-2-dehydrogenase (MDH)-expressing organisms, wherein the sugar substrates and/or sugar substrate precursors of MDH are transported into the organism via a non-phosphorylating sugar transport system.
2. A method according to Claim 1, characterised in that organisms containing, as a sugar transport system, the glucose facilitator (GLF) from a eukaryote are used.
3. A method according to Claim 1 for 2, characterised in that organisms containing, as a sugar transport system, the glucose facilitator (GLF) from *Zymomonas mobilis* are used.
4. A method according to Claim 2 or 3, characterised in that organisms containing the sequence No. 1 coding for GLF are used.
5. A method according to any one of Claims 1 to 4, characterised in that glucose and/or fructose are used as the sugar.
6. A method according to any one of the preceding claims, characterised in that organisms containing a sequence coding for MDH are used.
7. A method according to Claim 6, characterised in that organisms containing an MDH-coding sequence from microorganisms from the Lactobacteriaceae family, especially from *Leuconostoc pseudomesenteroides*, are used.
8. A method according to Claim 6 or 7, characterised in that organisms containing sequence No. 2 coding for MDH are used.

9. A method according to any one of the preceding claims, characterised in that organisms containing a sequence coding for a formiate dehydrogenase (FDH) are used.
10. A method according to Claim 9, characterised in that organisms containing an FDH-coding sequence from *Mycobacterium vaccae* are used.
11. A method according to Claim 9 or 10, characterised in that organisms containing sequence No. 3 coding for FDH are used.
12. A method according to any one of the preceding claims, characterised in that a microorganism is used as the organism.
13. A method according to any one of the preceding claims, characterised in that microorganisms from the genus *Bacillus*, *Pseudomonas*, *Lactobacillus*, *Leuconostoc*, the Enterobacteriaceae or methylotrophic yeasts and fungi are used.
14. A microorganism which expresses the enzymes MDH according to sequence No. 2 and FDH according to sequence No. 3 for the microbial production of D-mannitol and has a non-phosphorylating sugar transport system which transports the sugar substrate and/or sugar substrate precursors of MDH into the micro-organism.
15. A microorganism according to Claim 14, characterised in that the sugar transport system is the glucose facilitator (GLF) from a eukaryote.
16. A microorganism according to Claim 14 or 15, characterised in that the sugar transport system is the glucose facilitator (GLF) from *Zymomonas mobilis*.
17. A microorganism according to Claim 16, characterised in that the organism has the sequence No. 1 coding for GLF.

18. A microorganism according to Claims 14 to 17, characterised in that it converts glucose, fructose or mixtures thereof to D-mannitol.
19. A microorganism according to any one of the preceding Claims 14 to 18, characterised in that it contains an MDH-coding sequence from microorganisms from the Lactobacteriaceae family, especially preferably from *Leuconostoc pseudomesenteroides*.
20. A microorganism according to any one of the preceding Claims 14 to 19, characterised in that it contains an FDH-coding sequence from *Mycobacterium vaccae*.
21. A microorganism according to any one of the preceding Claims 14 to 20, characterised in that it originates from the genus *Bacillus*, *Lactobacillus*, *Leuconostoc*, the Enterobacteriaceae or methylotrophic yeasts and fungi and from all microorganisms also used in the foodstuffs industry.
22. Use of a microorganism according to any one of Claims 14 to 21 for the production of D-mannitol.
23. A nucleotide sequence according to sequence No. 1 coding for GLF for use in a microorganism according to any one of Claims 14 to 21.
24. A nucleotide sequence according to sequence No. 2 coding for MDH for use in a microorganism according to any one of Claims 14 to 21.
25. A nucleotide sequence according to sequence No. 3 coding for FDH for use in a microorganism according to any one of Claims 14 to 21.
26. A gene structure containing at least one or more nucleotide sequences according to Claims 23 to 25.

27. A vector containing at least one or more nucleotide sequences according to Claims 23 to 25 or one or more gene structures according to Claim 26.
28. Use of a nucleotide sequence according to any one of Claims 23 to 25 for transformation of a microorganism according to any one of Claims 14 to 21.
29. A microorganism according to any one of Claims 14 to 21 containing at least one gene structure according to Claim 26.
30. A microorganism according to any one of Claims 14 to 21 containing at least one vector according to Claim 27.